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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/611,544	07/01/2003	Kenneth K. Smith	10010715-3	4975

7590 02/10/2005

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EXAMINER	
SMITH, BRADLEY	
ART UNIT	**PAPER NUMBER**
2829	

DATE MAILED: 02/10/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/611,544	SMITH ET AL.	
	Examiner	Art Unit	
	Bradley K. Smith	2824	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 November 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) *15-22* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5 and 9-14* is/are rejected.

7)☒ Claim(s) *6-8* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *01 July 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *7/1/03*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☒ Other: *search notes*.

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of species I in the reply filed on 11/02/04 is acknowledged.

2. Claims 15-22 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected species, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 11/02/04.

Priority

3. If applicant desires benefit of a previously filed application under 35 U.S.C. 121, specific reference to the earlier filed application must be made in the instant application. For benefit claims under 35 U.S.C. 120, 121 or 365(c), the reference must include the relationship (i.e., continuation, divisional, or continuation-in-part) of the applications. This should appear as the first sentence(s) of the specification following the title, preferably as a separate paragraph unless it appears in an application data sheet. The status of nonprovisional parent application(s) (whether patented or abandoned) should also be included. If a parent application has become a patent, the expression "now Patent No. _____" should follow the filing date of the parent application. If a parent application has become abandoned, the expression "now abandoned" should follow the filing date of the parent application.

Specification

4. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: The method of making multiple logic bits per memory cell in a memory device.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 1-5 and 14 are rejected under 35 U.S.C. 102(e) as being anticipated by Lowrey et al. (US Patent 6,314,014). Lowrey et al. disclose providing a semiconductor substrate; forming electrically conductive columns on the semiconductor substrate; forming electrically conductive rows crossing over the electrically conductive columns (see figures 2a-2d); forming a plurality of memory components each having a resistance value corresponding to multiple logical bits (different resistance values)(see column 1 lines 30-60); and forming non-volatile memory cells, each formed by connecting a memory component between an electrically conductive row and an electrically conductive column. With regards to claim 2, Lowrey et al. disclose a component is formed to have a resistance value based on a thickness of electrically resistive material that forms an individual memory component (thickness is a component of volume)(see

column 1). With regards to claim 3, Lowery et al. disclose component is formed to have a resistance value based on an area of electrically resistive material that forms an individual memory component (by definition thickness x area = volume) (see column 1). With regards to claim 4, Lowery et al. disclose the component is formed to have a resistance value based on a shape (volume) of electrically resistive material that forms an individual memory component (see column 1). With regards to claim 5, Lowery et al. disclose the memory components are each formed to have a different resistance value based on a different area of electrically resistive material that forms a memory component (see column 1 lines 35-45). With regards to claim 14, Lowrey et al. disclose many layer of non-volatile memory cells (see figure 2A).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lowrey et al. (US Patent 6,314,014) in view of Dill et al. (US Patent 6,114,719). Lowrey et al. disclose providing a semiconductor substrate; forming electrically conductive columns on the semiconductor substrate; forming electrically conductive rows crossing over the electrically conductive columns (see figures 2a-2d); forming a plurality of memory components each having a resistance value corresponding to multiple logical bits

(different resistance values)(see column 1 lines 30-60); and forming non-volatile memory cells, each formed by connecting a memory component between an electrically conductive row and an electrically conductive column. However Lowrey et al. fail to disclose forming a resistor element in series with a diode. Whereas Dill et al. disclose the forming a resistor element in series with a diode. Therefore it would have been obvious to one of ordinary skill at the time the invention was made to combine the teachings of Lowrey et al. and Dill et al. because the diode would make sure that current would only go one way through the resistor.

9. Claims 10-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lowrey et al. (US Patent 6,314,014) in view of Apodaca et al. (US Pre-grant Publication 2003/0122170).). Lowrey et al. disclose providing a semiconductor substrate; forming electrically conductive columns on the semiconductor substrate; forming electrically conductive rows crossing over the electrically conductive columns (see figures 2a-2d); forming a plurality of memory components each having a resistance value corresponding to multiple logical bits (different resistance values)(see column 1 lines 30-60); and forming non-volatile memory cells, each formed by connecting a memory component between an electrically conductive row and an electrically conductive column. However Lowrey et al. fail to disclose changing the resistance value with light or heat. Whereas Apodaca et al. disclose that phase-change material's resistance values may be changed though light or heat (see paragraph 0016). Therefore it would have been obvious to one of ordinary skill at the time the invention was made to combine the teachings of Lowrey et al. and Apodaca et al. because one would be able

to control the resistance value of phase change materials and would make the it easier for a manufacturer to control that variable in devices.

Allowable Subject Matter

10. Claims 6-8 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

11. The following is a statement of reasons for the indication of allowable subject matter: the prior art of record neither teaches nor suggest within the context of the entire claim the components are each formed to have a resistance value based on a rectangular geometric shape of electrically resistive material that forms a memory component, at least some of the rectangular geometric shapes having different resistance values corresponding to an area of a rectangular geometric shape (claim 6), forming a first memory cell having a memory component that indicates logical bits 00 (zero-zero); forming a second memory cell having a memory indicates logical bits 01 (zero-one); component that forming a third memory cell having a memory component that indicates logical bits 10 (one-zero); and forming a fourth memory cell having a memory indicates logical bits 11 (one-one) (claim 7), forming a first memory cell that

indicates logical bits 00 (zero-zero) corresponding to a first resistance value based on an area of electrically resistive material that forms a memory component in the first memory cell; forming a second memory cell that indicates logical bits 01 (zero-one) corresponding to a second resistance value based on an area of electrically resistive material that forms a memory component in the second memory cell; forming a third memory cell that indicates logical bits 10 (one-zero) corresponding to a third resistance value based on an area of electrically resistive material that forms a memory component in the third memory cell; and forming a fourth memory cell that indicates logical bits 1 1 (one-one) corresponding to a fourth resistance value based on an area of electrically resistive material that forms a memory component in the fourth memory cell (claim 8) .

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Tajiri (US pregrant publication 2004/0090815) disclose a non-volatile variable resistor.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bradley K. Smith whose telephone number is (571) 272-1884. The examiner can normally be reached on 10-6 Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Elms can be reached on (571) 272-1869. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Brad Smith
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Art Unit 2829